



Harnessing HPC for Climate and Air Quality Insights

MS-CC Science and Research Technology Workshop

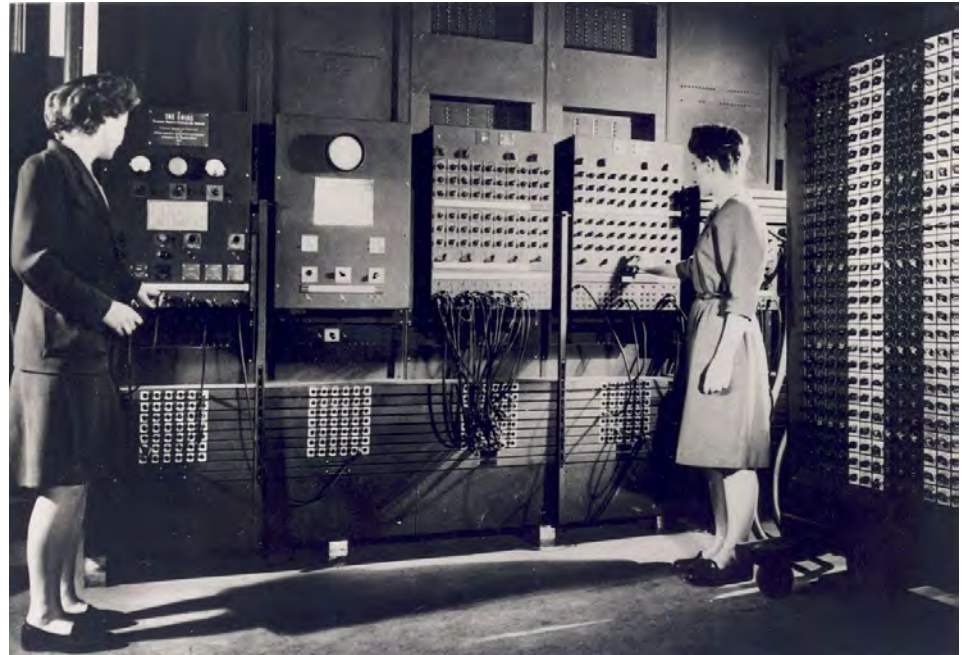
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What Shapes Our Atmosphere?



Weather Factory (Richardson's Dream)



ENIAC
(Electronic Numerical Integrator and Computer)

From Forest Fires to Floods

- “Wildfires, prescribed burns, and land use changes all influence the air we breathe and the rain we receive.
- Understanding these patterns requires more than just data it demands computing power and collaboration.”

Simulating Change: WRF and Land Use Impacts

- “My research uses the WRF model to simulate how changes in land use and land cover affect precipitation patterns.
- These simulations rely on high-performance computing to process massive climate datasets and generate meaningful insights.”
- “This helps us understand how urban expansion, deforestation, or agricultural shifts can alter local and regional weather.
- “Wildfires and prescribed burns release pollutants like PM_{2.5} and ozone precursors, impacting air quality across regions.

High-Performance Tools for High-Stakes Research

- “HPC systems allow us to run complex models like WRF efficiently.
- Secure campus networks and integrated platforms make it possible to share results and collaborate across institutions.”
- “The future of climate resilience is computational—and collaborative.”

Smart Tools for Smart Research

- ❑ Integrated Platforms “Tools that combine climate, agricultural, and environmental data helping researchers make informed decisions.”
- ❑ Secure Data Sharing “Campus networks and cloud systems that protect sensitive research data while enabling collaboration.”
- ❑ Drone Technology + Cyberinfrastructure “ Using drones for precision agriculture, supported by real-time data processing and secure storage.”



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